April 13, 2006

TO: Members of the MAG Specifications and Details Committee

FROM: Robert Herz, Maricopa County DOT, Chairman

SUBJECT: MEETING NOTIFICATION AND TRANSMITTAL OF AGENDA

Wednesday, May 3, 2006, 1:30 p.m.
MAG Office, Second Floor, Cholla Room
302 North First Avenue, Phoenix

The meeting of the MAG Specifications and Details Committee will be held at the place and time indicated above. The agenda for the meeting is provided below. **Please park in the garage under the Compass Bank Building. Bring your ticket to the meeting, parking will be validated. For those using transit, the Regional Public Transportation Authority will provide transit tickets for your trip. For those using bicycles, please lock your bicycle in the bike rack in the garage.** Please call me at (602) 506-4760 if you have questions about the upcoming meeting.

Pursuant to Title II of the Americans with Disabilities Act (ADA), MAG does not discriminate on the basis of disability in admissions to or participation in its public meetings. Persons with a disability may request a reasonable accommodation, such as a sign language interpreter, by contacting Gordon Tyus at the MAG Office at (602) 254-6300. Requests should be made as early as possible to allow time to arrange the accommodation.

AGENDA

ITEM	COMMITTEE ACTION REQUESTED
1. Call to Order	1. No action required.
2. Approval of April 5, 2006 Meeting Minutes	2. Corrections and approval of April 5, 2006 minutes.
3. 2006 Cases	3. For Review, discussion, and submission of cases.
4. General Discussion	4. For information and discussion. AGC/ARPA Proposed Draft Revisions. RFP Consultant Selection Status.
5. Adjournment	5. No action required.

MEETING MINUTES FROM THE MARICOPA ASSOCIATION OF GOVERNMENTS STANDARD SPECIFICATIONS AND DETAILS COMMITTEE

April 5, 2006

Maricopa Association of Governments Office, Cholla Room
302 North First Avenue
Phoenix, Arizona

AGENCY MEMBERS

Jim Badowich, Avondale
David Fern, Chandler
Mark Weiner, Gilbert
* Greg Rodzenko, Glendale
* Tom Vassallo, Goodyear
Bob Herz, MCDOT, Chairman
* Steven Borst, MCESD
Kelly Jensen, Mesa
* Maher Hazine, Peoria
Jeff Van Skike, Phoenix (St. Trans.)
Matthew Woodland, Phoenix (Water)
Rodney Ramos, Scottsdale
Don Moseley, Surprise
James Bond, Tempe

ADVISORY MEMBERS

John Ashley, ACA
Jeff Benedict, AGC
Brian Gallimore, AGC
* Peter Kandaris, SRP, Vice Chairman
* Don Cornelison, ARPA
* Don Green, ARPA
Paul R. Nebeker, Independent
William Ast, NUCA
Dale Phelan, NUCA

MAG ADMINISTRATIVE STAFF

Gordon Tyus

* Members not attending or represented by proxy.

GUESTS/VISITORS

Bill Toon, City of Surprise

1. Call to Order

Chairman, Bob Herz, called the meeting to order at 1:35 p.m.

2. Approval of Minutes

Corrections to the March 1, 2006 meeting minutes were called for. Gordon Tyus advised the members of the following corrections to the listing of advisory members:

Jeff Benedict represents AGC,
Don Green represents ARPA
Don Cornelison represents ARPA

Matthew Woodland introduced a motion to accept the minutes as corrected. David Fern seconded the motion. The motion was carried unanimously.

3. 2006 Cases

a. **Case 06-01 – Safety Rail addition to Concrete Scupper Detail 206**: Updated revisions to Details 206-1 and 206-2 were handed out by Bob Herz dated April 5, 2006. Changes included the addition of tie bars at the bottom of the dowels in Section B to aid in construction, revision to Section A-A dimensioning the scupper throat opening to be 8 inches with no minimum, and labeled the back of curb score mark on the isometric view "score mark as required by agency". Discussion recommended deletion of "as recommended by agency" from the score mark label. Discussion also recommended the scupper throat opening shown in Section D-D as 8 inches minimum be revised to 8 inches. The discussion recommendations have been incorporated into the attached detail.

b. **Case 06-02 – Clarifications to Detail 440**: Bob Herz handed out specification page 615-2 showing the following revisions:

Section 615.7 SANITARY SEWER SERVICE TAPS changed the depth of electronic markers to coordinate with the depths as shown on Detail 440. The last sentence was revised to read: Electronic markers shall be placed at no greater depth than electronic locating devices can locate~~d~~ them (typically ~~4' 8'~~2'-4').

Section 615.6.2 Water Stops added the requirement for water stops on PVC pipes by revising the first sentence to read: Water stops will be required when connecting PVC or HDPE pipe to concrete structures, manholes, etc.

Matthew Woodland indicated that that timing for City of Phoenix revisions for Detail 440-2 was uncertain.

Discussion addressed the possible need for water stops on concrete pipes to prevent potential leakage.

4. General Discussion:

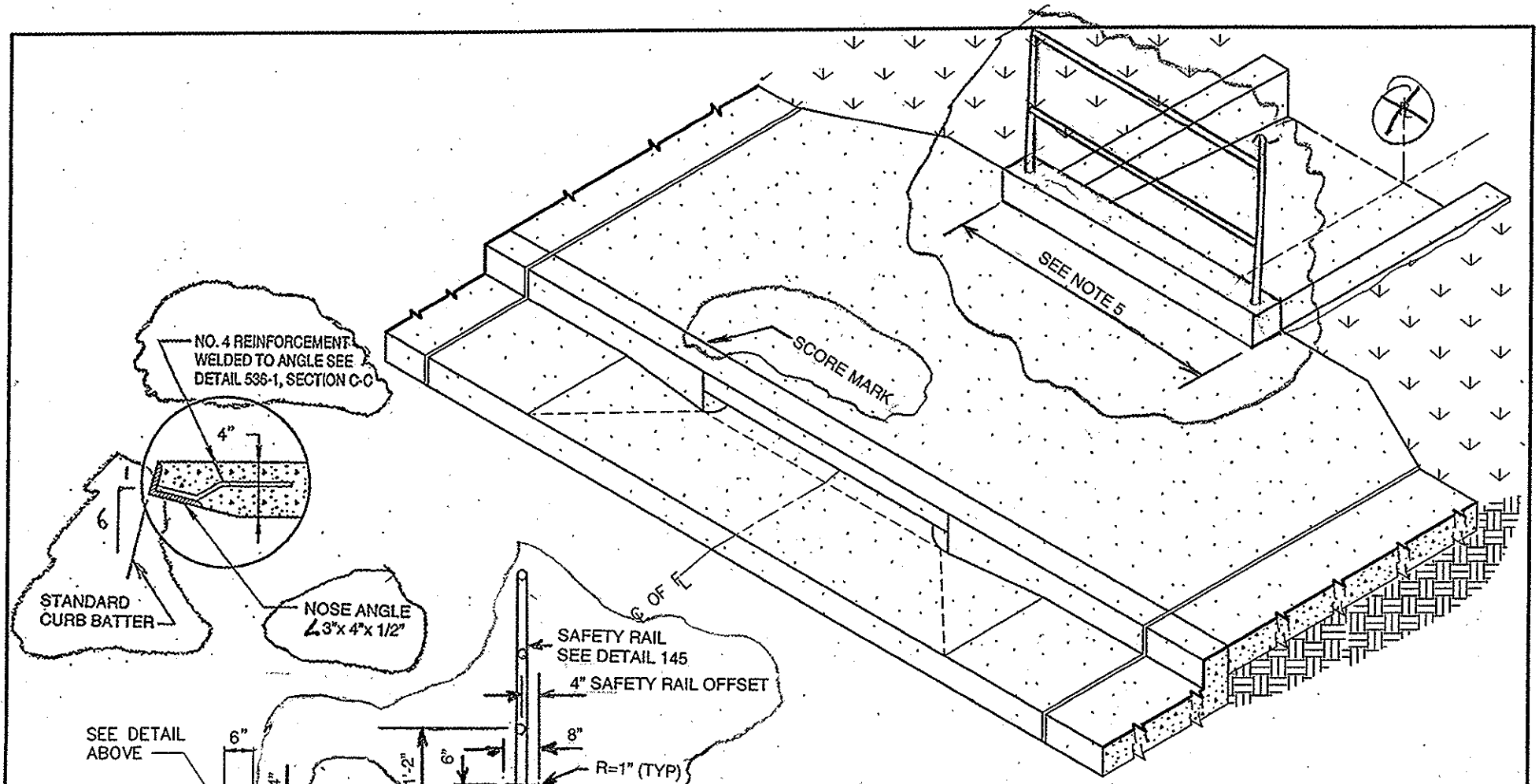
a. Jeff Benedict on behalf of the joint committee of AGC and ARPA distributed three handouts related to a draft rewrite of Section 710 Asphalt Concrete. One handout contained draft revision plus comments explaining changes made from the present

MAG version of section 710. A second handout contained the draft revision in final form without comments. The third handout "RELATED DOCUMENTS" identified references used during the revision process. Mr. Benedict indicated that the referenced documents are available on the Internet and he provided one hardcopy set of the referenced documents to be available at the MAG offices for reference purposes. The Joint Asphalt Paving and Technical Committee of the local chapter of the Associated General Contractors (AGC) and the Arizona Rock Products Association (ARPA) would like to receive feedback from the Committee concerning their revision efforts. The Agency Committee Members should be prepared to provide comments at the next meeting.

b. Gordon Tyus provided a status update for the Specifications and Details Inventory RFP. He said that the Management Committee approved the consultant selection on the consent agenda earlier in the day, and that the item would go to the Regional Council Executive Committee on April 17th for final approval. He also mentioned that the consultants had been contacted and that the committee could begin finalizing a scope of work.

5. Adjournment:

The meeting was adjourned at 2:06 p.m.



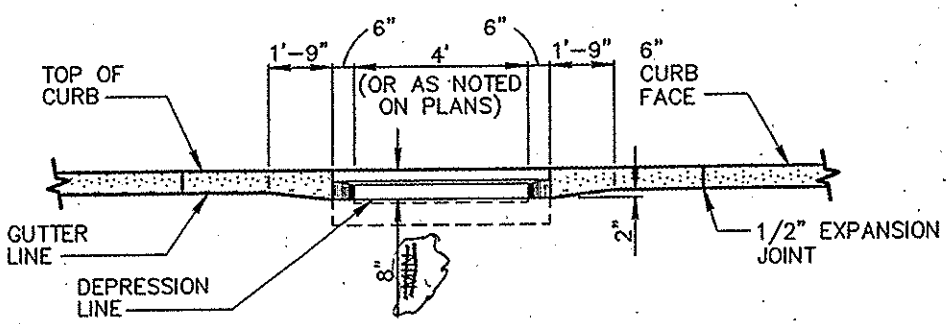
SECTION D--D

NOTES:

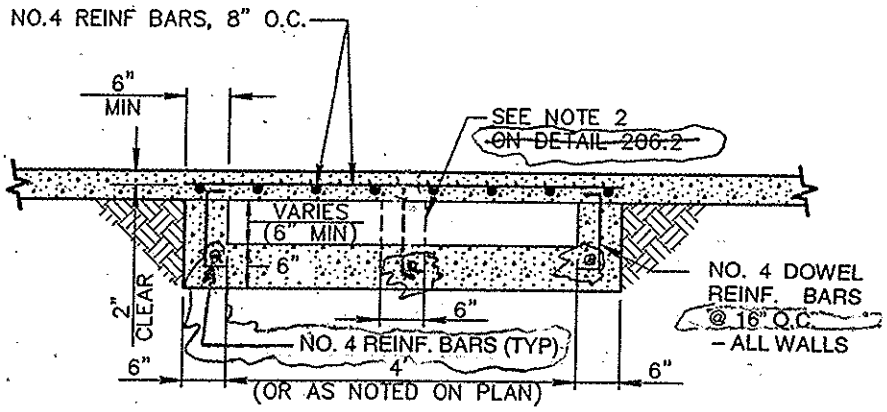
1. TRANSITION TO SPILLWAY/CHANNEL AS PER APPROVED PLANS.
2. A CENTER WALL SHALL BE INSTALLED IN SCUPPERS WIDER THAN 4' OR IF MORE THAN 1 SCUPPER IS BUILT IN SERIES.
3. EXPANSION JOINT FILLER SHALL BE 1/2" BITUMINOUS TYPE PREFORMED EXPANSION JOINT FILLER, A.S.T.M.D-1751.
4. UNLESS OTHERWISE NOTED, CONCRETE SHALL BE CLASS 'B' PER SECTION 725.
5. SAFETY RAIL AND CURB SHALL BE CONTINUOUS BETWEEN THE SPILLWAY EXTERIOR WALLS.

DETAIL NO.			REVISED	DETAIL NO.
206-2	MARICOPA ASSOCIATION of GOVERNMENTS STANDARD DETAIL ENGLISH	CONCRETE SCUPPER	01-01-2007	206-2

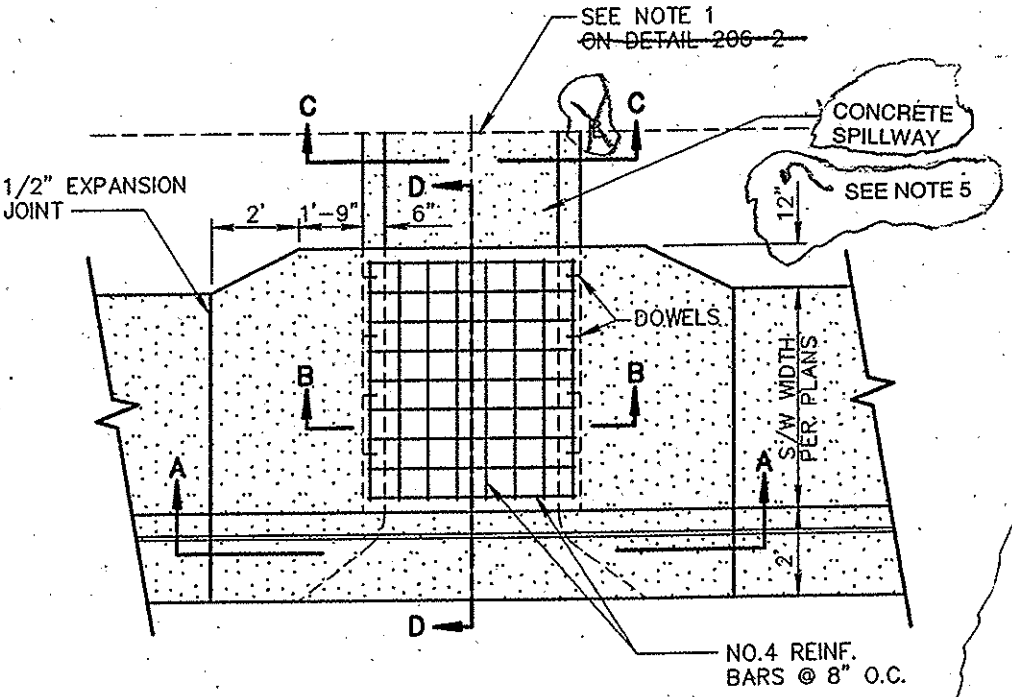
CASE 06-01
Revised 4/5/2006



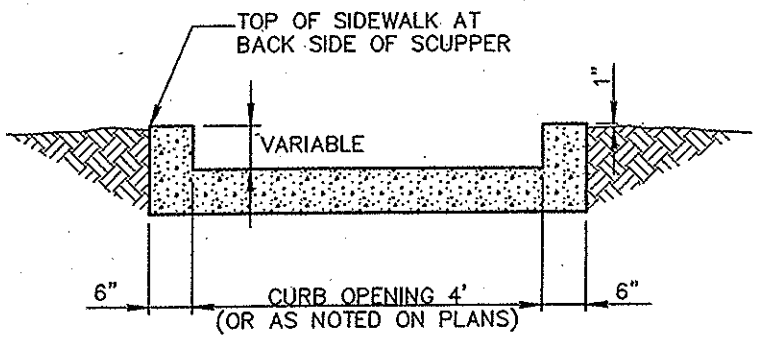
SECTION A–A



SECTION B–B



SCUPPER PLAN VIEW



SECTION C–C
SPILLWAY

NOTES:

1. TRANSITION TO SPILLWAY/CHANNEL AS PER APPROVED PLANS.
2. A CENTER WALL SHALL BE INSTALLED IN SCUPPERS WIDER THAN 4' OR IF MORE THAN 1 SCUPPER IS BUILT IN SERIES.
3. EXPANSION JOINT FILLER SHALL BE 1/2" BITUMINOUS TYPE PREFORMED EXPANSION JOINT FILLER, ASTM D-1751.
4. UNLESS OTHERWISE NOTED, CONCRETE SHALL BE CLASS 'B' PER SECTION 725.
5. 12" OFFSET DISTANCE SHALL BE INCREASED TO 2'-6" FOR DESIGNATED BICYCLE PATHS.

DETAIL NO.			REVISED	DETAIL NO.
206–1	MARICOPA ASSOCIATION of GOVERNMENTS STANDARD DETAIL ENGLISH	CONCRETE SCUPPER	01-01-2007	206–1

CASE 06-01
Revised 4/5/2006

SECTION 710

ASPHALT CONCRETE
04/03/06

710.1 GENERAL:

Asphalt concrete shall be a mixture of asphalt cement and mineral aggregates. Mineral admixture, mineral filler and anti-stripping agent shall be included in the mixture when required by the mix design or by the Engineer. All materials shall be proportioned by weight in a central mix plant in the proportions required by the mix design to provide a homogeneous and workable mass.

The designations for asphalt concrete mixes shall be based on the nominal maximum aggregate size of the mix. The applicable mix designations are 3/8 inch, 1/2 inch, 3/4 inch, and Base Mix. The minimum lift thickness for Marshall Mixes shall be 2½ times the nominal maximum aggregate size; while the minimum lift thickness for Gyratory mixes shall be 3½ times the nominal maximum aggregate size.

Each mix can be designed using Marshall or Gyratory compaction methods. Marshall Mixes may be used for low or high traffic conditions, while Gyratory mixes will typically be used for high traffic conditions. Low traffic conditions are conditions where the asphalt mix will be subject to low volume and low weight vehicle usage. Examples of this condition are residential streets, most parking lots, and residential minor collector streets. High traffic conditions are conditions where the asphalt mix will be subject to high volume and/or heavy weight vehicle usage as found on major collector, arterial, and commercial streets. Street classifications (i.e. minor collector and major collector) shall be determined by the specifying agency.

710.2 MATERIALS:

710.2.1 Asphalt Cement: The asphalt cement specified in this section has been developed for use in desert climate conditions. Should it be utilized in other climates, consideration should be given to adjustments in the asphalt selection. The asphalt cement shall be performance grade asphalt conforming to the requirements of Section 711 for PG 70-10, unless approved by the Engineer or otherwise specified in the plans or special provisions.

710.2.2 Aggregate: Coarse and fine aggregates shall conform to the applicable requirements of this section. Coarse mineral aggregate shall consist of crushed gravel, crushed rock, or other approved inert material with similar characteristics, or a combination thereof, conforming to the requirements of these specifications.

Coarse aggregate is material retained above the Number 4 sieve and fine aggregate is material passing the Number 4 sieve. Aggregates shall be free of deleterious materials, clay balls, and adhering films or other material that prevent thorough coating with the asphalt cement. Mineral aggregate shall conform to the following requirements when tested in accordance with the applicable test methods.

TABLE 710-1
COARSE/FINE AGGREGATE REQUIREMENTS

Characteristics	Test Method	Low Traffic	High Traffic
Fractured Faces, % (Coarse Aggregate Only)	**Arizona 212**	75.0, 1 or more	85.0, 1 or more 80.0, 2 or more
Uncompacted Voids, % Min.	AASHTO T-304, Method A	42.0	45.0
Flat & Elongated Pieces, % 5:1 Ratio	ASTM D-4791	10.0 Max.	10.0 Max.
Sand Equivalent, %	AASHTO T-176	50.0 Min.	50.0 Min.
Plasticity Index	AASHTO T-90	Nonplastic	Nonplastic
L.A. Abrasion, %Loss	AASHTO T-96	9 max. @ 100 Rev. 40 max. @ 500 Rev.	9 max. @ 100 Rev. 40 max. @ 500 Rev.
Combined Bulk Specific Gravity	Arizona 815	2.35 – 2.85	2.35 – 2.85
Combined Water Absorption	Arizona 815	0 – 2.5%	0 – 2.5%

Tests on aggregates outlined above, shall be performed on materials furnished for mix design purposes and composited to the mix design gradation.

Blend sand (naturally occurring or crushed fines) shall be clean, hard and sound material, which will readily accept asphalt coating. The blend sand properties shall be such that, when it is mixed with the other mineral aggregates, the combined product shall meet the requirements of table 710-1.

710.2.3 Mineral Filler, Mineral Admixture and Anti-Stripping Agent:

Mineral filler shall conform to the requirements of AASHTO M-17. The amount of mineral filler shall be determined by the mix design.

Mineral admixture shall be dry hydrated lime, conforming to the requirements of ASTM C-1097, or Portland cement conforming to MAG Section 725 Type II or Type IP. The amount of hydrated lime or Portland cement used shall be determined by the mix design. The minimum cement content will be 1.0 percent, while the minimum hydrated lime content will be 0.75 percent, both by weight of the total aggregate.

710.3 MIX DESIGN REQUIREMENTS:

710.3.1 General: The mix design for the project shall be prepared by a laboratory that is accredited through the AASHTO Accreditation Program in Hot Mix Asphalt Aggregates and Hot Mix Asphalt and has met the requirements of the Arizona Department of Transportation's (ADOT) current "System for Evaluation of Testing Laboratories". The requirements may be obtained from ADOT Materials Group. The laboratory shall be under the direct supervision of a Civil Engineer, registered by the State of Arizona, with a minimum of five years experience in the development of asphalt concrete mix designs, and who is currently an ADOT qualified asphalt concrete mix design engineer. The date of the design shall not be older than two years from the date of submittal, unless supportive documentation is provided and approved by the Engineer.

The mix design report shall include the following elements as a minimum:

1. The name and address of the testing organization and the person responsible for the mix design testing.
2. The mix plant identification and/or location as well as the supplier or producer name.
3. A description of all products that are incorporated in the asphalt concrete along with the sources of all products, including mineral admixtures and asphalt cement, and their method of introduction.
4. The supplier and grade of asphalt cement, the source and type of mineral admixture, and the percentage of asphalt cement and mineral admixture to be used.
5. The results of all testing, determinations, etc., such as: specific gravity and gradation of each component, water absorption, sand equivalent, loss on abrasion, fractured coarse aggregate particles, immersion compression results (Index of Retained Strength, wet and dry strengths), Marshall stability and flow, asphalt absorption, percent air voids, voids in mineral aggregate, and bulk density. Historical abrasion values may be supplied on existing sources. The submittal should include a plot of the gradation on the Federal Highway Administration s 0.45 Power Gradation Chart, plots of all compaction curves and the results of moisture sensitivity testing.
6. Viscosity-Temperature curve along with the laboratory mixing and compaction temperature ranges.
7. A specific recommendation for design asphalt content and any limiting conditions that may be associated with the use of the design, such as minimum percentages of crushed or washed fine aggregate.
8. The suppliers product code, the laboratory Engineer's seal (signed and dated), and the date the design was performed.

The mix design shall be submitted to the Agency by the Contractor/Supplier for which it was developed as part of his project submittals. Once the mix design has been approved by the agency and the mixing plant selected, the Contractor and/or his supplier shall not change plants nor utilize additional mixing plants unless changed to another currently approved source.

Any changes in the plant operation, the producer's pit, the asphalt cement, including modifiers, or any other item that will cause an adjustment in the mix, shall be justification for a new mix design to be submitted.

710.3.2 Mix Design Criteria: The mix design shall be performed by one of two methods, Marshall Mix Design or Gyratory Mix Design. The method shall be specified on the plans, special provisions, or by the Engineer. A minimum of 4 points will be used to establish the mix design results. The oven aging period for both Marshall and Gyratory mix design samples shall be 2 hours.

710.3.2.1 Marshall Mix Design: Marshall Mix Designs shall be performed in accordance with the requirements of ADOT's current Arizona Test Method 815. The mix shall utilize a compactive effort described of 75 blows per side of specimen. The mix shall comply with the criteria in Table 710-2.

TABLE 710-2
ASPHALT CONCRETE MIX DESIGN CRITERIA

Criteria	Requirements			Arizona Test Method
	3/8" Mix	1/2" Mix	3/4" & Base Mix	
1. Voids in Mineral Aggregate: %, Range	15.0 – 18.0	14.0 – 17.0	12.0 – 16.0	815
2. Effective Voids: %, (High Traffic)	4.0 ± 0.2	4.0 ± 0.2	4.0 ± 0.2	815
3. Effective Voids: %, (Low Traffic)	3.0 ± 0.2	3.0 ± 0.2	3.0 ± 0.2	815
4. Absorbed Asphalt: %, Range	0 - 1.0	0 - 1.0	0 - 1.0	815
5. Index of Retained Strength: %, Min.	60	60	60	802
6. Wet Strength: psi, Minimum	150	150	150	802
7. Stability: pounds, Minimum	2,000	2,500	2,500	815
8. Flow: 0.01-inch, Range	8 - 16	8 - 16	8 - 16	815
9. Mineral Aggregate Grading Limits				201

Sieve Size	Percent Passing			
	3/8 inch Mix	1/2 inch Mix	3/4 inch Mix	Base Mix
1-1/4 inch				100
1 inch			100	90-100
3/4 inch		100	90 - 100	85-95
1/2 inch	100	85 - 100	---	
3/8 inch	90-100	62 - 85	62 - 77	57-72
No. 8	45-60	40 – 50	35 – 47	33-43
No. 40	10-22	10 - 20	10 – 20	9-18
No. 200	3.0 – 6.5	2.5 – 6.0	2.5 – 6.0	2.0-5.0

The ratio of the mix design composite gradation target for the No. 200 sieve, including admixture, to the effective asphalt content shall be within the range 0.6 to 1.4.

710.3.2.2 Gyratory Mix Design: Gyratory Mix Designs shall be performed in accordance with the requirements of ADOT's Arizona Test Method 815 with the noted exceptions. Mix design laboratory compacted test specimens, except for Arizona Test Method 802, shall be prepared using a gyratory compactor in accordance with AASHTO T 312.

The mix design shall be formulated in a manner described in the American Association of State Highway and Transportation Officials' (AASHTO), **"Standard Practice for Superpave Volumetric Design for Hot-Mix Asphalt (HMA) (AASHTO-R-35)"** except that volumetrics will be determined in accordance with Arizona Test Method 815, and the number of trial blend gradations necessary will be determined by the mix design laboratory. Duplicate gyratory samples shall be prepared at a minimum of four (4) binder contents to select the recommended binder content. The completed mix design shall meet all the mineral aggregate and mix design criteria specified herein.

For purposes of design, the number of gyrations shall be 8 for Nini, 100 for Ndes, and 160 for Nmax. The corrected density of the specimens shall be less than 89.0 percent of maximum theoretical density at 8 gyrations. The corrected density of the specimens shall be less than 98.0 percent of maximum theoretical density at 160 gyrations.

The mix shall comply with the criteria in Table 710-3.

TABLE 710-3
ASPHALT CONCRETE MIX DESIGN CRITERIA

Criteria	Requirements			Arizona Test Method
	3/8 inch Mix	1/2 inch Mix	3/4 inch Mix	
1. Voids in Mineral Aggregate: %, Range	15.0 – 18.0	14.0 – 17.0	13.0 – 16.0	815
2. Effective Voids: %, Range	4.5 ± 0.2	4.5 ± 0.2	4.5 ± 0.2	815
3. Absorbed Asphalt: %, Range	0 - 1.0	0 - 1.0	0 - 1.0	815
4. Index of Retained Strength: %, Min.	70	70	70	802
5. Wet Strength: psi, Minimum	150	150	150	802
6. Mineral Aggregate Grading Limits				201

Sieve Size	Percent Passing		
	3/8 inch Mix	1/2 inch Mix	3/4 inch Mix
1 inch			100
3/4 inch		100	90-100
1/2 inch	100	90-100	43-89
3/8 inch	90-100	53-89	-
No. 8	32-47	29-40	24-36
No. 40	2-24	3-20	3-18
No. 200	4.5-8.0	4.0-7.5	3.5-6.5

The ratio of the mix design composite gradation target for the No. 200 sieve, including admixture, to the effective asphalt content shall be within the range 0.8 to 1.2.

710.3.2.3 Moisture Sensitivity Testing: Moisture sensitivity testing will be performed in accordance with Arizona Test Method 802 for both Marshall and Gyratory mix designs. The minimum required retained strength is indicated in the tables above. When applicable, test specimens shall be prepared by replacing the plus 3/4 inch material of the composite with material passing the 3/4 inch sieve and retained on the 1/2 inch sieve size fraction during mineral aggregate sample weigh up.

ASPHALT CONCRETE
04/03/06

710.1 GENERAL:

Asphalt concrete shall be a mixture of asphalt cement and mineral aggregates. Mineral admixture, mineral filler and anti-stripping agent shall be included in the mixture when required by the mix design or by the Engineer. All materials shall be proportioned by weight in a central mix plant in the proportions required by the mix design to provide a homogeneous and workable mass.

The designations for asphalt concrete mixes shall be based on the nominal maximum aggregate size of the mix. The applicable mix designations are 3/8 inch, 1/2 inch, 3/4 inch, and Base Mix. The minimum lift thickness for Marshall Mixes shall be 2½ times the nominal maximum aggregate size; while the minimum lift thickness for Gyratory mixes shall be 3½ times the nominal maximum aggregate size.

Each mix can be designed using Marshall or Gyratory compaction methods. Marshall Mixes may be used for low or high traffic conditions, while Gyratory mixes will typically be used for high traffic conditions. Low traffic conditions are conditions where the asphalt mix will be subject to low volume and low weight vehicle usage. Examples of this condition are residential streets, most parking lots, and residential minor collector streets. High traffic conditions are conditions where the asphalt mix will be subject to high volume and/or heavy weight vehicle usage as found on major collector, arterial, and commercial streets. Street classifications (i.e. minor collector and major collector) shall be determined by the specifying agency.

710.2 MATERIALS:

710.2.1 Asphalt Cement: The asphalt cement specified in this section has been developed for use in desert climate conditions. Should it be utilized in other climates, consideration should be given to adjustments in the asphalt selection. The asphalt cement shall be performance grade asphalt conforming to the requirements of Section 711 for PG 70-10, unless approved by the Engineer or otherwise specified in the plans or special provisions.

710.2.2 Aggregate: Coarse and fine aggregates shall conform to the applicable requirements of this section. Coarse mineral aggregate shall consist of crushed gravel, crushed rock, or other approved inert material with similar characteristics, or a combination

This paragraph remains the same as in the existing MAG document.

Table has been removed due to misapplication of target lift thickness. Lift thickness info has been moved to second paragraph.

This paragraph simplifies the identification/designation of the permissible asphalt mixes.

These minimum lift thicknesses will bring us into line with national experience (NAPA, NCAT, etc.). This will also facilitate improved compaction which results in increased longevity/durability.

This is similar to existing document, but expanded to address applicable mix design method.

This paragraph remains similar to original document, but provides the Engineer the opportunity to select an asphalt binder grade appropriate for the expected environmental and traffic loading conditions.

This remains similar to original, but brings all aggregate requirements within this specification section.

thereof, conforming to the requirements of these specifications.

Coarse aggregate is material retained above the Number 4 sieve and fine aggregate is material passing the Number 4 sieve. Aggregates shall be free of deleterious materials, clay balls, and adhering films or other material that prevent thorough coating with the asphalt cement. Mineral aggregate shall conform to the following requirements when tested in accordance with the applicable test methods.

This remains similar to original document, but establishes a new size delineating coarse aggregate from fine aggregate. This was done to conform to standard industry practice in the western U.S.

This also identifies additional aggregate properties requirements (not present in existing MAG).

TABLE 710-1
COARSE/FINE AGGREGATE REQUIREMENTS

Characteristics	Test Method	Low Traffic	High Traffic
Fractured Faces, % (Coarse Aggregate Only)	**Arizona 212**	75.0, 1 or more	85.0, 1 or more 80.0, 2 or more
Uncompacted Voids, % Min.	AASHTO T-304, Method A	42.0	45.0
Flat & Elongated Pieces, % 5:1 Ratio	ASTM D-4791	10.0 Max.	10.0 Max.
Sand Equivalent, %	AASHTO T-176	50.0 Min.	50.0 Min.
Plasticity Index	AASHTO T-90	Nonplastic	Nonplastic
L.A. Abrasion, %Loss	AASHTO T-96	9 max. @ 100 Rev. 40 max. @ 500 Rev.	9 max. @ 100 Rev. 40 max. @ 500 Rev.
Combined Bulk Specific Gravity	Arizona 815	2.35 – 2.85	2.35 – 2.85
Combined Water Absorption	Arizona 815	0 – 2.5%	0 – 2.5%

Standard test method protocol to be established, for aggregate properties and mix properties.

Set SE requirement for all mixes to a minimum of 50

Established specific abrasion requirements for asphalt mixes.

Added specific gravity and water absorption requirements to preclude use of inferior, porous aggregates.

Tests on aggregates outlined above, shall be performed on materials furnished for mix design purposes and composited to the mix design gradation.

Blend sand (naturally occurring or crushed fines) shall be clean, hard and sound material, which will readily accept asphalt coating. The blend sand properties shall be such that, when it is mixed with

Eliminated maximum limit on natural sand, but require combined material to satisfy all aggregate properties.

the other mineral aggregates, the combined product shall meet the requirements of table 710-1.

710.2.3 Mineral Filler, Mineral Admixture and Anti-Stripping Agent:

Mineral filler shall conform to the requirements of AASHTO M-17. The amount of mineral filler shall be determined by the mix design.

Mineral admixture shall be dry hydrated lime, conforming to the requirements of ASTM C-1097, or Portland cement conforming to MAG Section 725 Type II or Type IP. The amount of hydrated lime or Portland cement used shall be determined by the mix design. The minimum cement content will be 1.0 percent, while the minimum hydrated lime content will be 0.75 percent, both by weight of the total aggregate.

710.3 MIX DESIGN REQUIREMENTS:

710.3.1 General: The mix design for the project shall be prepared by a laboratory that is accredited through the AASHTO Accreditation Program in Hot Mix Asphalt Aggregates and Hot Mix Asphalt and has met the requirements of the Arizona Department of Transportation's (ADOT) current "System for Evaluation of Testing Laboratories". The requirements may be obtained from ADOT Materials Group. The laboratory shall be under the direct supervision of a Civil Engineer, registered by the State of Arizona, with a minimum of five years experience in the development of asphalt concrete mix designs, and who is currently an ADOT qualified asphalt concrete mix design engineer. The date of the design shall not be older than two years from the date of submittal, unless supportive documentation is provided and approved by the Engineer.

The mix design report shall include the following elements as a minimum:

1. The name and address of the testing organization and the person responsible for the mix design testing.
2. The mix plant identification and/or location as well as the supplier or producer name.
3. A description of all products that are incorporated in the asphalt concrete along with the sources of all products, including mineral admixtures and asphalt cement, and their method of introduction.
4. The supplier and grade of asphalt cement, the source and type of mineral admixture, and the percentage of asphalt cement and mineral

Same as in current MAG.

Correct lime designation and present less confusing description of admixture use.

Eliminate reference to liquid anti-stripping agents due to technical and/or safety concerns.

The requirement for ADOT approval is based on their system for evaluation of qualified firms and mix design engineers. The goal is for uniformity in testing and evaluation by an experienced engineer.

These requirements are more detailed and inclusive than previously specified. They relate to identifying potential performance rather than merely fulfilling paperwork requirements.

admixture to be used.

5. The results of all testing, determinations, etc., such as: specific gravity and gradation of each component, water absorption, sand equivalent, loss on abrasion, fractured coarse aggregate particles, immersion compression results (Index of Retained Strength, wet and dry strengths), Marshall stability and flow, asphalt absorption, percent air voids, voids in mineral aggregate, and bulk density. Historical abrasion values may be supplied on existing sources. The submittal should include a plot of the gradation on the Federal Highway Administration's 0.45 Power Gradation Chart, plots of all compaction curves and the results of moisture sensitivity testing.
6. Viscosity-Temperature curve along with the laboratory mixing and compaction temperature ranges.
7. A specific recommendation for design asphalt content and any limiting conditions that may be associated with the use of the design, such as minimum percentages of crushed or washed fine aggregate.
8. The suppliers product code, the laboratory Engineer's seal (signed and dated), and the date the design was performed.

The mix design shall be submitted to the Agency by the Contractor/Supplier for which it was developed as part of his project submittals. Once the mix design has been approved by the agency and the mixing plant selected, the Contractor and/or his supplier shall not change plants nor utilize additional mixing plants unless changed to another currently approved source.

Similar to existing MAG Specification with clarification.

Any changes in the plant operation, the producer's pit, the asphalt cement, including modifiers, or any other item that will cause an adjustment in the mix, shall be justification for a new mix design to be submitted.

This paragraph remains unchanged from the current MAG.

710.3.2 Mix Design Criteria: The mix design shall be performed by one of two methods, Marshall Mix Design or Gyratory Mix Design. The method shall be specified on the plans, special provisions, or by the Engineer. A minimum of 4 points will be used to establish the mix design results. The oven aging period for both Marshall and Gyratory mix design samples shall be 2 hours.

This paragraph remains essentially unchanged from the current MAG.

710.3.2.1 Marshall Mix Design: Marshall Mix Designs shall be performed in accordance with the requirements of ADOT's current Arizona Test Method 815. The mix shall utilize a compactive effort described of 75 blows per side of specimen. The mix shall comply with the criteria in Table 710-2.

Don Green to compare ADOT vs. AI methods.

TABLE 710-2
ASPHALT CONCRETE MIX DESIGN CRITERIA

Criteria	Requirements			Arizona Test Method
	3/8 inch Mix	1/2 inch Mix	3/4 inch & Base Mix	
1. Voids in Mineral Aggregate: %, Range	15.0 – 18.0	14.0 – 17.0	12.0 – 16.0	815
2. Effective Voids: %, (High Traffic)	4.0 ± 0.2	4.0 ± 0.2	4.0 ± 0.2	815
3. Effective Voids: %, (Low Traffic)	3.0 ± 0.2	3.0 ± 0.2	3.0 ± 0.2	815
4. Absorbed Asphalt: %, Range	0 - 1.0	0 - 1.0	0 - 1.0	815
5. Index of Retained Strength: %, Min.	60	60	60	802
6. Wet Strength: psi, Minimum	150	150	150	802
7. Stability: pounds, Minimum	2,000	2,500	2,500	815
8. Flow: 0.01-inch, Range	8 - 16	8 - 16	8 - 16	815
9. Mineral Aggregate Grading Limits				201

Sieve Size	Percent Passing			
	3/8 inch Mix	1/2 inch Mix	3/4 inch Mix	Base Mix
1-1/4 inch				100
1 inch			100	90-100
3/4 inch		100	90 - 100	85-95
1/2 inch	100	85 - 100	---	
3/8 inch	90-100	62 - 85	62 - 77	57-72
No. 8	45-60	40 – 50	35 – 47	33-43
No. 40	10-22	10 - 20	10 – 20	9-18
No. 200	3.0 – 6.5	2.5 – 6.0	2.5 – 6.0	2.0-5.0

The ratio of the mix design composite gradation target for the No. 200 sieve, including admixture, to the effective asphalt content shall be within the range 0.6 to 1.4.

Increased the Marshall stability requirement for all mixes
Added absorbed asphalt requirement
Immersion compression reference ADOT methods.
Eliminate restricted zone per NCAT Research; see handout
Modified gradations for the Marshall Mix Designs
Eliminate grading bands with no admix,

710.3.2.2 Gyratory Mix Design: Gyratory Mix Designs shall be performed in accordance with the requirements of ADOT's Arizona Test Method 815 with the noted exceptions. Mix design laboratory compacted test specimens, except for Arizona Test Method 802, shall be prepared using a gyratory compactor in accordance with AASHTO T 312.

The mix design shall be formulated in a manner described in the American Association of State Highway and Transportation Officials' (AASHTO), **"Standard Practice for Superpave Volumetric Design for Hot-Mix Asphalt (HMA) (AASHTO-R-**

Provide a standard mix design procedure with specific steps and less room for interpretation.

35)" except that volumetrics will be determined in accordance with Arizona Test Method 815, and the number of trial blend gradations necessary will be determined by the mix design laboratory. Duplicate gyratory samples shall be prepared at a minimum of four (4) binder contents to select the recommended binder content. The completed mix design shall meet all the mineral aggregate and mix design criteria specified herein.

For purposes of design, the number of gyrations shall be 8 for Nini, 100 for Ndes, and 160 for Nmax. The corrected density of the specimens shall be less than 89.0 percent of maximum theoretical density at 8 gyrations. The corrected density of the specimens shall be less than 98.0 percent of maximum theoretical density at 160 gyrations.

Gyration levels have been standardized based on nationwide industry consensus and mixture stiffness studies (see handout).

The mix shall comply with the criteria in Table 710-3.

TABLE 710-3
ASPHALT CONCRETE MIX DESIGN CRITERIA

Criteria	Requirements			Arizona Test Method
	3/8 inch Mix	1/2 inch Mix	3/4 inch Mix	
1. Voids in Mineral Aggregate: %, Range	15.0 – 18.0	14.0 – 17.0	13.0 – 16.0	815
2. Effective Voids: %, Range	4.5 ± 0.2	4.5 ± 0.2	4.5 ± 0.2	815
3. Absorbed Asphalt: %, Range	0 - 1.0	0 - 1.0	0 - 1.0	815
4. Index of Retained Strength: %, Min.	70	70	70	802
5. Wet Strength: psi, Minimum	150	150	150	802
6. Mineral Aggregate Grading Limits				201

Sieve Size	Percent Passing		
	3/8 inch Mix	1/2 inch Mix	3/4 inch Mix
1 inch			100
3/4 inch		100	90-100
1/2 inch	100	90-100	43-89
3/8 inch	90-100	53-89	-
No. 8	32-47	29-40	24-36
No. 40	2-24	3-20	3-18
No. 200	4.5-8.0	4.0-7.5	3.5-6.5

The ratio of the mix design composite gradation target for the No. 200 sieve, including admixture, to the effective asphalt content shall be within the range 0.8 to 1.2.

710.3.2.3 Moisture Sensitivity Testing: Moisture sensitivity testing will be performed in accordance with Arizona Test Method 802 for both Marshall and Gyratory mix designs. The minimum required retained strength is indicated in the tables above. When applicable, test specimens shall be prepared by replacing the plus 3/4 inch material of the composite

Consistent use of specifications

Acceptance criteria from previous version (710.4 – 710.6) have been placed in construction section of specifications (e.g. MAG 321).

Moisture sensitivity testing has been revised to utilize Immersion Compression (IMC) method rather than Tensile Strength Ratio (TSR). Large body of existing test data/performance data; significantly more experience with this method on the types of mixes used in this area.

with material passing the 3/4 inch sieve and retained on the 1/2 inch sieve size fraction during mineral aggregate sample weigh up.